



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,862	09/15/2003	Makoto Nagashima	GSN001	2141
31688	7590	01/12/2005	EXAMINER	
TRAN & ASSOCIATES 6768 MEADOW VISTA CT. SAN JOSE, CA 95135			VERSTEEG, STEVEN H	
			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 01/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/662,862

Applicant(s)

NAGASHIMA ET AL.

Examiner

Steven H VerSteeg

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10, 12-17, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 9, 11 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “**230**” has been used to designate both “magnetron” and “wafer chuck” (see Figure 3). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **222, 224, 236, 234, 232, and 233**. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the

Art Unit: 1753

applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: **10, 14, 30, 22, 24, 36, 34, 32, 33, 150, 152, 260, 541, and 543**. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 10-15 are objected to because of the following informalities: "The apparatus" should be "The facing targets sputtering device" in claims 10-15; "FTS" needs the acronym to be expanded in claim 10. Claims 11-14 depend from claim 10 and contain all of the limitations of claim 10. Therefore, claims 11-14 are objected to for the same reasons as claim 10. Appropriate correction is required.

5. Claims 14 and 15 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 14 requires a substrate holder, but it is already

claimed in claim 1. Claim 15 recites the limitation that the semiconductor layer is a "CMOS" layer, but the limitation does not provide any apparatus structural limitations.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 5, 6, and 13-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 5 recites the limitation "the remaining target plate" in line 2. There is insufficient antecedent basis for this limitation in the claim.

9. Claim 6 recites the limitation "the first and second target power supplies" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

10. Claim 13 recites the limitation "the substrates" in line 1. There is insufficient antecedent basis for this limitation in the claim.

11. Claim 14 depends from claim 13 and contains all of the limitations of claim 13. Therefore, claim 14 is rejected for the same reasons as claim 13.

12. Claim 15 recites the limitation "the semiconductor layer" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. Claims 1-8, 10, 13-17, 19, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,482,329 B1 to Takahashi et al. (Takahashi).
15. For claim 1, Applicant requires a facing targets sputtering device comprising an air-tight chamber, a pair of target plates placed at opposite ends of the air tight chamber so as to face each other and form a plasma region therebetween; a pair of magnets respectively disposed adjacent to the target plates such that magnet poles of different polarities face each other across the plasma region thereby to establish a magnetic field; a substrate holder adjacent to the plasma region; and a back-bias power supply coupled to the substrate holder.
16. Takahashi discloses a facing targets sputtering device (Figure 6) comprising an air tight chamber (Figure 5); pair of targets facing each other **607a** and **607b**; a pair of magnets **608b** adjacent the targets with different polarities facing each other (Figure 6); a substrate holder **602**; and a back bias power supply for the substrate **611**.
17. For claim 2, Applicant requires the back-bias power supply to be AC. Takahashi discloses the substrate bias to be AC (col. 3, l. 34).
18. For claims 3 and 5, Applicant requires a first target power supply coupled to one of the target plates. Takahashi discloses a target power supply **612**.
19. For claims 4 and 6, Applicant requires the target power supply to be DC. Takahashi discloses the limitation (col. 3, l. 34-35).
20. For claim 7, Applicant requires a robot arm to move the wafer. The rotating drum can be considered to be a robot arm meeting the limitation.

21. For claim 8, Applicant requires a magnetron coupled to the chamber. The magnets **610a-d** coupled to the additional targets can be considered to meet the limitation.
22. For claim 10, Applicant requires first and second targets mounted in parallel. Targets **609a** and **609b** are in parallel (Figure 6).
23. For claim 13, Applicant requires the substrate to be positioned perpendicularly to the planes of the targets. Figure 6 shows such an arrangement in Takahashi.
24. For claim 14, Applicant requires the substrate holder to secure the substrate. The substrate is inherently secured to the holder else it would fall off.
25. For claim 15, Applicant requires the semiconductor layer to be a CMOS layer. As the claim is not further limiting, all of the limitations of claim 15 are met because the limitations of claim 1 are met as noted above.
26. For claim 16, Applicant requires a method for sputtering a thin film onto a substrate comprising providing at least one target and a substrate having a film forming surface portion and a back portion; creating a magnetic field so that the film forming surface portion is placed in the magnetic field with the magnetic field induced normal to the substrate surface portion; back-biasing the back portion of the substrate; and sputtering material onto the film forming surface portion.
27. Takahashi, as noted above, discloses a sputtering apparatus with back-biasing of the substrate; magnets that form a magnetic field; at least one target; and the magnetic field normal to the substrate (Figure 6). The method of using the apparatus is also disclosed (Embodiment 1).
28. For claim 17, Applicant requires a pair of targets opposed to each other where the substrate is disposed between the targets. Figure 6 shows the arrangement.

Art Unit: 1753

29. For claim 19, Applicant requires supporting a chuck from underneath rather than sideway. As can be seen from Figure 6, the limitation is met.

30. For claim 20, Applicant requires providing a plurality of sources to deposit materials onto the substrate. Figure 6 shows 4 different sources.

Claim Rejections - 35 USC § 103

31. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

32. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,482,329 B1 to Takahashi et al. (Takahashi) in view of US 5,415,754 to Manley.

33. For claim 12, Applicant requires a power supply coupled to the magnets and the targets. Takahashi shows permanent magnets, not electromagnets and thus, does not disclose a power supply coupled to the magnets.

34. Manley discloses that permanent magnets are equivalent to electromagnets in sputtering applications (col. 15, l. 32-35).

35. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Takahashi to utilize electromagnets as taught by Manley because of the desire to utilize art recognized equivalents.

Allowable Subject Matter

36. Claims 9 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

37. Claim 11 would be allowable if written to overcome the claim objection presented above.

38. The following is a statement of reasons for the indication of allowable subject matter: it is neither anticipated nor obvious over the prior art of record to have a facing targets sputtering device as claimed by Applicant in claims 9 and 11. It is also neither anticipated nor obvious over the prior art of record to have a method for sputtering a thin film as claimed by Applicant in claim 18.

39. Takahashi discloses using a water cooling method to cool the substrate (col. 7, l. 33-41), but does not disclose heating the substrate. Cooling the substrate is removal of heat, so heating the substrate would be obvious. However, placement of the heater "above the wafer" as claimed would not be obvious unless hindsight reasoning is used.

40. The magnets in Takahashi are behind the target. The placement of the magnets is not "between the targets" as claimed in claim 11. To change the arrangement of the magnets would change the magnetic field of Takahashi and thus would not be obvious.

41. Takahashi discloses rotating the substrate on a chuck. The rotation is not equivalent to swinging a pendulum. Thus, swinging a pendulum is not obvious.

General Information

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

Art Unit: 1753

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.


For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Steven H VerSteeg
Primary Examiner
Art Unit 1753

shv
January 10, 2005